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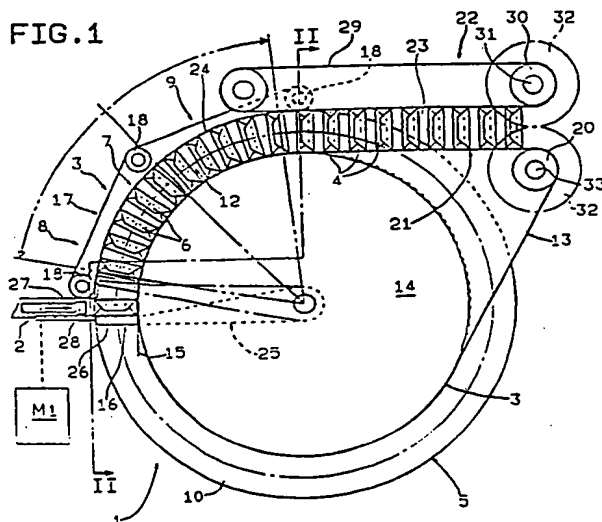
(56) Documents cited  
GB 1544644 A EP 0395809 A1

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INT CL<sup>5</sup> B65B 51/10 51/16 51/18

## (54) Sealing wrappers

(57) Commodities 4, eg cigarette packets, emerge from a wrapping or overwrapping machine enveloped in respective wrappers to be sealed, and are directed by an infeed mechanism 2, driven by drive means M1, into one end of a channel 12 that forms the basis of a sealing device 1 which comprises a feed means 24, by which the commodities 4 are directed along the channel 12, and a drive system (M, Figure 2), independent of drive means M1, by which the feed means 24 is moved in such a manner as to determine the duration of the passage of the single commodity along the sealing channel 12 according to the physical properties of the wrapping material and independently of the frequency at which the commodities 4 are received from the wrapping machine. Channel 12 preferably defines an arc of a circle and may be defined radially inwardly and outwardly by guide belts 13, and laterally by sealing, rotating heated discs (10, Figure 2), the axis of rotation of the discs being angled so that the minimum clearance between the raised profiles (11, Figure 2) of the discs occurs midway along the channel 12. A push rod 28 may move each commodity from the wrapping machine to the channel, a rockable forked element with prongs 26 acting in association with a plate 15 and a pair of restraining plates (27, Figure 2) to transfer the commodity between a position aligned with infeed mechanism 2 and a position at the start of the channel 12. A rectilinear branch 23, defined by further conveyor belts, may form a runout channel.

FIG.1



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FIG.1

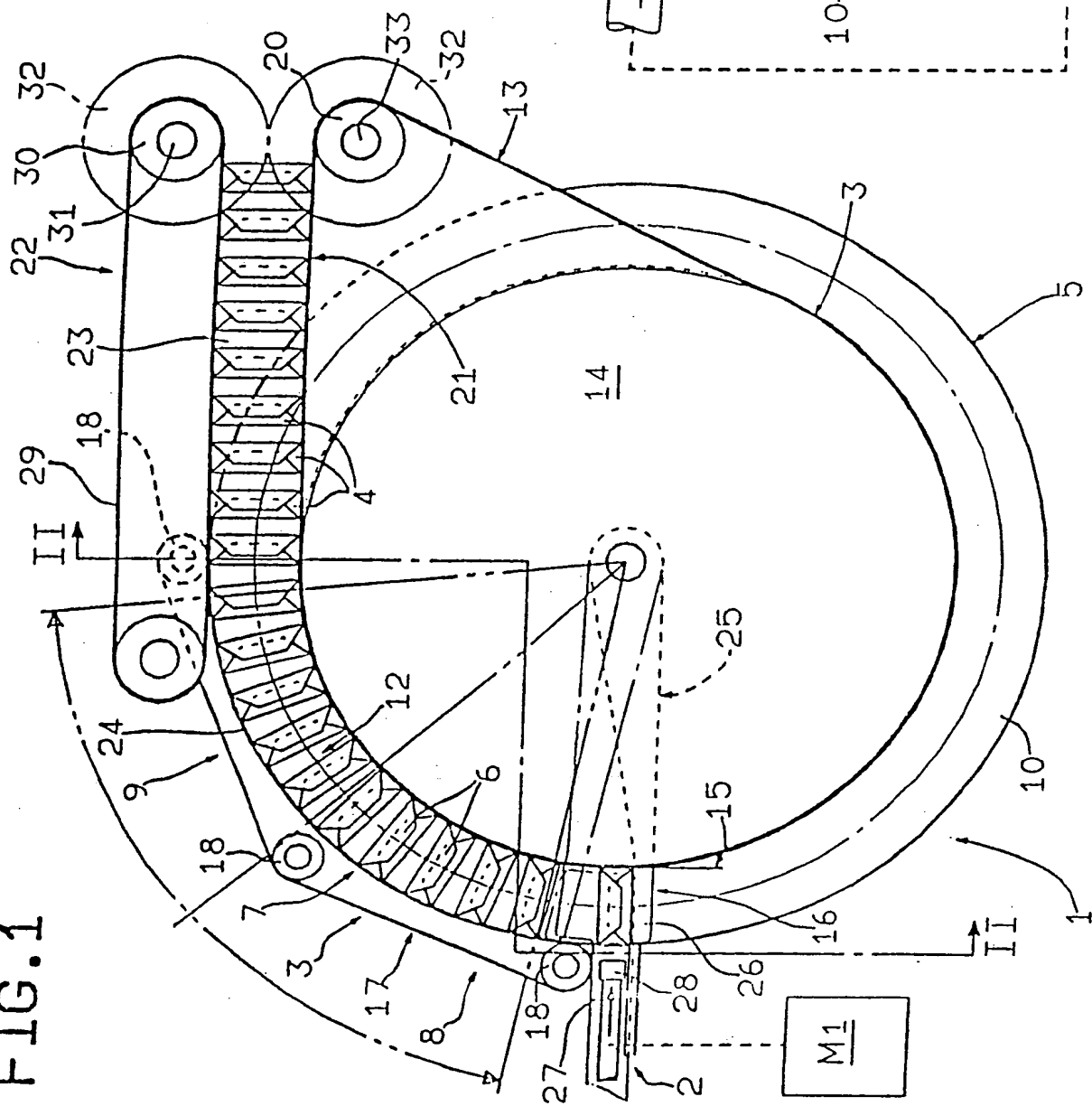
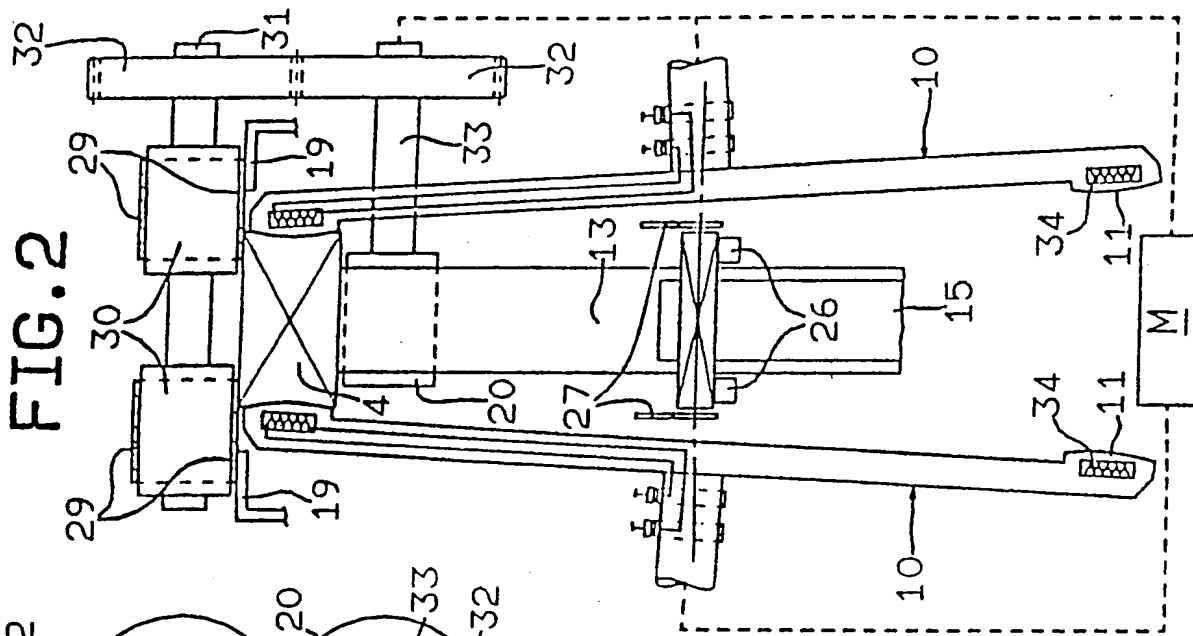


FIG.2



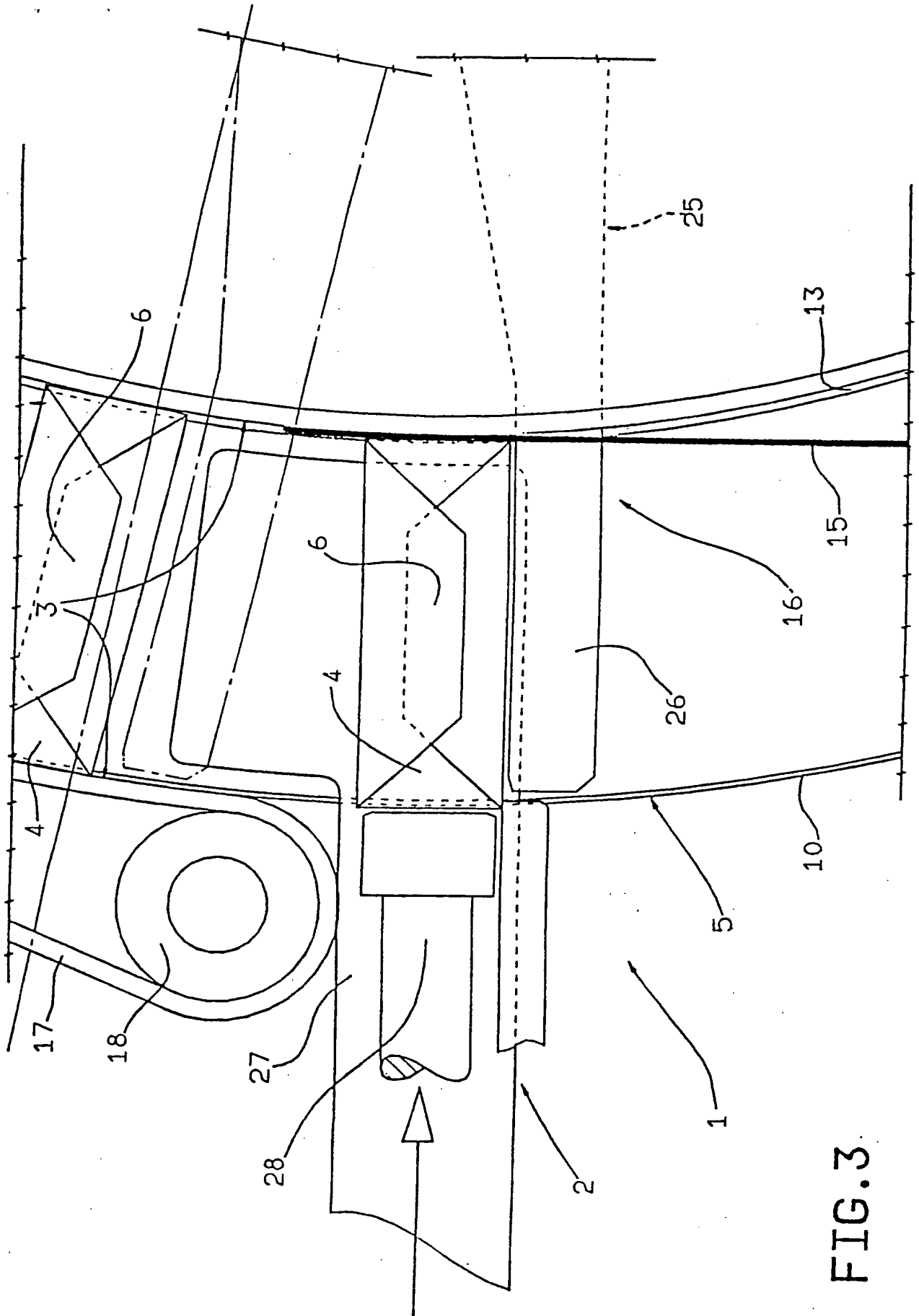


FIG. 3

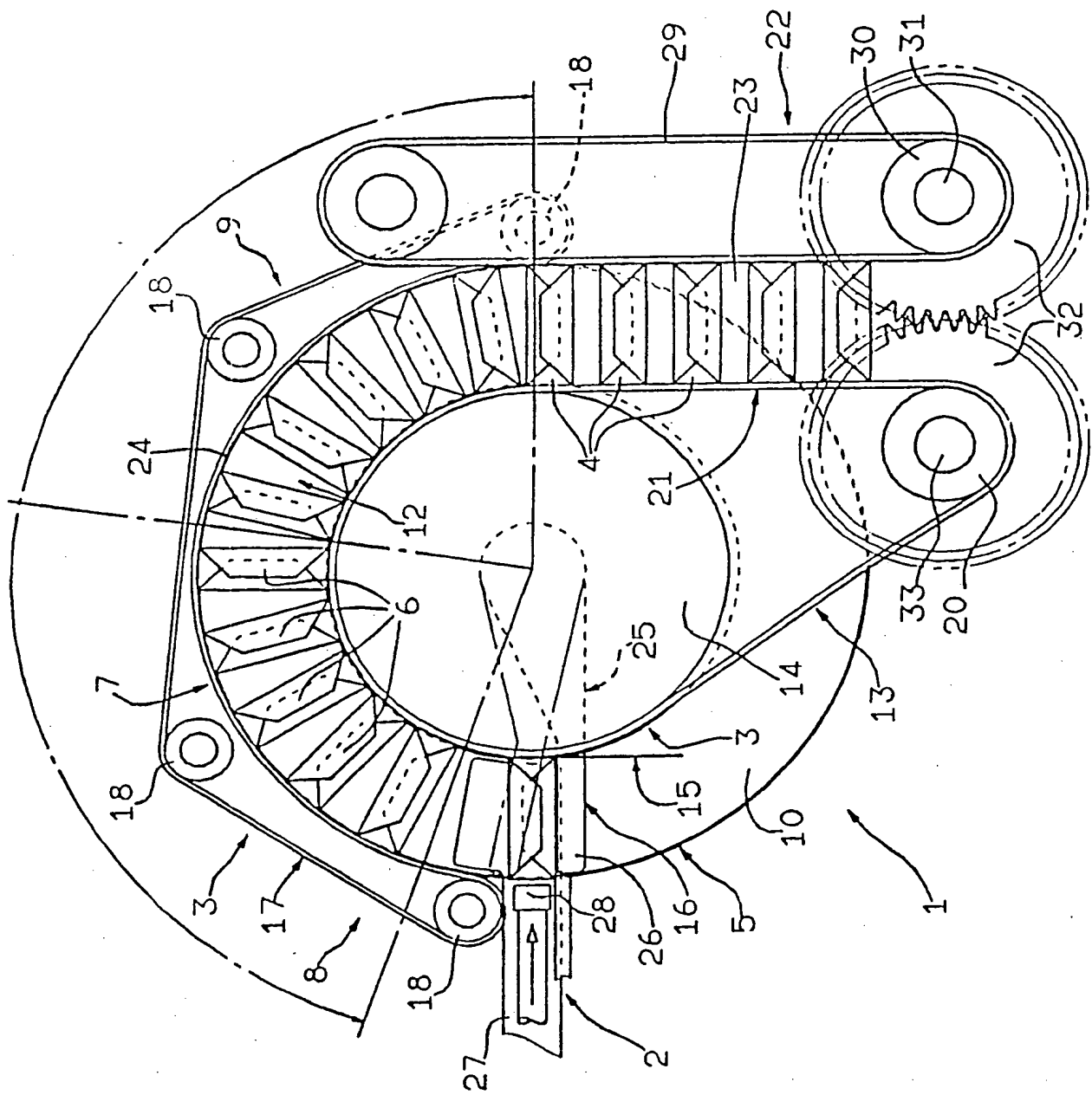


FIG 4

A device for sealing wrappers in machines for wrapping and/or overwrapping commodities, in particular packets of cigarettes

The present invention relates to a device for sealing wrappers in machines for wrapping and/or overwrapping commodities, in particular packets of cigarettes.

05 It is a fundamental requirement when heat-sealing thermoplastic materials, or other materials bonded with an interfacing layer of hot melt adhesive, that the elements which perform the sealing action be held in contact with the parts to be sealed for  
10 a period of time that remains constant in duration and depends solely upon the nature of the sealed materials.

This signifies an unvarying duration of contact, irrespective of the rate at which commodities are  
15 directed toward and through the sealing station. By the same token, the products must be conveyed at speed, and not unduly slowed down by the sealing operation.

The prior art embraces devices equipped with a pair  
20 of heated plates positioned on opposite sides of a

conveyor belt along which the single commodities are carried, each enveloped in a relative wrapper. The plates are reciprocated through an operating stroke, which brings them into contact with the end  
05 faces of the wrappers, and a corresponding return stroke.

It is absolutely essential with such devices that the duration of contact between the plates and the relative faces of the wrappers can be varied, since  
10 the thermoplastic material from which the wrappers are fashioned must be heated up to but not beyond a given temperature, whatever the operating speed of the machine.

The general practice is to connect the two plates  
15 to a non-adjustable source of energy, for example to one or more electrical resistances, and then to determine the exact duration of the contact between plates and wrapper employing a variety of means.

Given that no wrapping machine will ever operate at  
20 one constant speed, it follows that the duration of contact between the heated plates and the wrapper needs to be matched to the different speeds of the machine.

In the device of Italian Patent n° 1,018,092, for  
25 example, the duration of contact between the heated

plates and the end folds of a wrapper is determined by means of a single cam type element which affords two or more profiles engaged by a following roller associated mechanically with the plates.

05 Whilst the sealing device embodied in this way has proved capable of effective and precise operation over time, it nonetheless betrays a marked lack of flexibility inasmuch as a change in the operating speed of the machine dictates the replacement of  
10 the cam, with obvious drawbacks.

The object of the present invention is to provide a device from which the drawbacks mentioned above are eliminated in a simple and functional manner.

The stated object is realized in a device according  
15 to the invention for sealing wrappers in machines for wrapping and/or overwrapping commodities, in particular packets of cigarettes; such a device is supplied by relative infeed means with commodities enveloped in the respective wrappers to be sealed,  
20 and characterized in that it comprises a sealing channel into which the commodities are directed at one end by the infeed means, feed means by which the commodities are directed along the channel, and drive means by which the feed means are set in  
25 motion in such a way as to determine the duration

of the passage of each commodity along the sealing channel according to given physical properties of the wrappers and independently of the operating tempo of the infeed means.

05 The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

-fig 1 shows the device according to the invention in a schematic side elevation;

10 -fig 2 is a section through II-II in fig 1, shown with certain parts cut away and certain omitted better to reveal others;

-fig 3 shows a detail of fig 1, enlarged and in side elevation;

15 -fig 4 is an alternative embodiment of the device illustrated in figs 1-3, shown in side elevation. With reference to the drawings, 1 denotes a device according to the invention, in its entirety, by which wrappers are sealed in a machine for wrapping  
20 and/or overwrapping commodities 4, in particular packets of cigarettes; such a device 1 comprises relative infeed means 2 by which the commodities 4 are transferred in succession from the machine, each enveloped in a respective wrapper ready to be  
25 sealed.

The device 1 comprises a sealing channel 12 located following the infeed means 2, in relation to the flow of commodities, and feed means 24 by which the commodities 4 are directed along the channel. The feed means 24 are set in motion by respective drive means M independently of the infeed means 2 and in such a manner that the commodities 4 will occupy the channel 12 for a duration of which the value is maintained constant, and dictated exclusively by the physical properties of the wrappers: "physical properties" signifying such characteristics as will contribute to the realization of a faultless seal, i.e. those of the material from which the wrappers are fashioned, including the thickness, in the case of a heat-sealable material, and the physical and chemical attributes of the adhesives in the event that the wrapping is fashioned from other types of material such as paper.

As discernible from figs 1 and 2 in particular, the channel 12 is compassed by guide means 3, and means denoted 5 by which the commodities 4 are compressed bilaterally and sealed.

With regard to the various elements which make up the device 1, the guide means 3 occupy and operate within at least a limited area of the device 1, and

are positioned in such a way as to remain entirely clear of the faces 6 of the commodities 4 destined to be sealed.

05 The feed means 24 occupy and operate in at least the same area as is occupied by the guide means 3. Finally, the bilateral compression and sealing means 5 are designed to impinge during the sealing step, and within the compass of the guide means 3, on at least one of the faces 6 of the commodity 4  
10 to be sealed.

The bilateral compression and sealing means 5 are structured and positioned in such a manner as to engage in contact with the commodities 4 advanced by the guide means 3, at least through a trajectory  
15 of predetermined length denoted 7.

As shown in the drawings, the bilateral compression and sealing means 5 consist in a pair of rotatable heated disks 10. In the example illustrated, more exactly, the rotating and heated disks 10 are one  
20 and the same as the feed means 24, and constitute the side walls of the sealing channel 12.

The axes of rotation of the disks 10 are angled in relation to the axis of the sealing channel 12, in such a way that the minimum clearance between the  
25 disks occurs substantially midway along the length

of the channel.

In practice, the effect of inclining the axes of rotation of the heated disks 10 is to divide the trajectory 7 established by the sealing channel 12 into a first stretch 8 and a second stretch 9, the latter succeeding the former in relation to the motion of the feed means 24. The illustration of the trajectory 7 and its two component stretches 8 and 9 is limited to an indication of the relative angular distances, in the interests of simplicity. The first and second stretches 8 and 9 differ one from another in that the compressive force applied to the commodities 4 by the bilateral compression and sealing means 5 increases gradually through the first stretch 8 and decreases gradually through the second stretch 9. Compressive force transmitted to a commodity 4 by the rotating and heated disks 10 is therefore maximum when the clearance between the two disks is minimum. As discernible clearly enough from figs 1 and 4, the trajectory 7 describes an arc to a circle of which the centre coincides with the intersection of the axes of the rotating and heated disks 10.

To reiterate, the principal feature of the device 1 according to the invention is that the rotating and

heated disks 10 are driven about their respective axes at an angular velocity which remains constant and entirely independent of the operating speed of the wrapping machine.

05 The heated portion of each disk 10 consists in a raised circumferential profile 11 disposed coaxial with the disk and directed toward a similar raised profile 11 afforded by the remaining disk 10 (see fig 2, in which 34 denotes electrical resistances embedded in the relative profiles 11).

10 As discernible from fig 2, the raised profiles 11 appear substantially rounded in section, in such a manner that the maximum compressive force of the disks can be applied to the commodities 4 exactly in the central part of the faces 6 to be sealed.

15 Such a feature is important when the commodities 4 are packets of cigarettes and the faces 6 to be sealed are the top and bottom ends of the packet, in which case the central parts of the two faces 6 coincide with the overlapping end folds of the wrapper and require greater pressure and heat.

20 In the embodiments illustrated, the guide means 3 can be one and the same as the feed means 24, or alternatively, both the guide means and bilateral compression and sealing means 5 may coincide with

25

the feed means 24. At all events, the guide means 3  
compass the sealing channel 12 on opposite sides,  
extending through the circular arc described by the  
trajectory 7, and comprise at least one element  
05 capable of movement synchronously with the rotating  
and heated disks 10. The guide means 3 compassing  
the channel 12 on the inside consist in at least  
one conveyor belt 13 looped around a corresponding  
pulley 14 and set in rotation synchronously with  
10 the heated disks 10 about an axis passing through  
the intersection of the angled axes of rotation of  
the disks.

The infeed means 2 by which the commodities 4 are  
transferred from the wrapping machine can be of any  
15 given type, for example comprising a push rod 28  
invested with rectilinear movement and capable of  
advancing the commodities 4 toward the device 1  
through a radial direction, considered in relation  
to the pulley 14, as illustrated in the drawings.

20 In this instance the device 1 comprises a plate 15,  
disposed facing and transverse to the direction of  
movement of the push rod 28 and tangential to the  
pulley 14, and means 16 by which to transfer each  
commodity 4 from the infeed means 2 to the device 1  
25 proper. Such transfer means 16 will be capable of

movement, timed opportunely with that of the infeed means 2, at least through a path describing an arc to a circle of which the centre coincides with the intersection of the axes of rotation of the two rotating and heated disks 10, as shown in fig 1. More exactly, the transfer means 16 are capable of movement at least between a first limit position of reception, in which a commodity 4 is disposed in alignment with the infeed means 2 and in contact with the plate 15, and a second limit position of release in which the commodity 4 occupies the first stretch 8 of the sealing trajectory 7. Observing figs 1 and 2, it will be seen that the rotating and heated disks 10 are set in motion by the drive means M aforementioned, whilst the infeed means 2 are driven by further means M1 of which the first means M are independent as already intimated. In the example of the drawings, transfer means 16 consist in a fork element 25 located internally of the pulley 14 and capable of rocking between the two limit positions, described above, about an axis passing through the intersection of the angled axes of rotation of the disks 10. The prongs 26 of the fork element 25 are positioned on opposite sides of the conveyor belt 13 and the pulley 14, and free to

oscillate between the pulley 14 and a relative pair of restraining plates 27. The plates 27 terminate all but in contact with the raised profiles 11 of the disks 10 and are able, in the event that the commodities 4 are packets of cigarettes, to keep the end folds of the wrapper pressed firmly against the packet and thus prevent them working adrift. The guide means 3 compassing the sealing channel 12 externally will be seen to consist in at least one conveyor belt 17 looped around relative pulleys 18, which is driven synchronously with the rotating and heated disks 10 and rides slidably over respective contour guides 19, in such a way that the branch of the belt 17 effectively delimiting the channel 12 describes an arc to a circle of which the centre coincides with the intersection of the angled axes of rotation of the heated disks 10.

The first mentioned belt 13 of the guide means 3 is looped also around a second pulley 20 positioned in such a way as to combine with the first pulley 14 in drawing a part of the belt 13 into a rectilinear branch denoted 21; this same branch 21 combines in its turn with additional opposing conveyor means 22 to create a runout channel 23 continuing from and tangential to the sealing channel 12.

Observing fig 2, it will be seen that the conveyor means 22 consist in a pair of belts 29 occupying a common plane and lying parallel to the rectilinear branch 21 afforded by the inner conveyor belt 13 of the guide means 3. The two belts 29 are positioned on either side of the external belt 17 in such a way that there is no break in continuity between the sealing channel 12 and the runout channel 23. To ensure that the belts 13 and 29 which combine to create the runout channel will operate at uniform velocity, the paired belts 29 are looped around respective pulleys 30 keyed to a shaft 31 connected mechanically by way of a pair of meshing gears 32 (transmission ratio  $i = 1$ ), to a further shaft 33 onto which the aforementioned second pulley 20 is keyed.

The embodiment shown in fig 4 differs essentially from that of fig 1 only insofar as the sealing channel 12 is dissimilar in length; more exactly, the increased length of the channel 12 permits of increasing the velocity at which the commodities 4 are fed through the device 1 while maintaining the duration of the sealing step at a constant value. The main advantage of the present invention is that of the independence in operation of the device 1

and the machine with which it is associated, and by extension, of the fact that the timing of the steps involved in the sealing operation can be maintained constant irrespective of the production tempo of the wrapping machine, the speed of rotation of the disks 10 being selected to suit the determining physical properties of the wrapping material used in manufacture.

No less advantageous, economically and functionally considered, and from the standpoint of maintenance, is the fact that there are no components required to interact synchronously between the device 1 and the machine other than the fork element 25.

In short, the device according to the invention affords extreme flexibility.

**Claims**

- 1) A device for sealing wrappers in machines for wrapping and/or overwrapping commodities, packets of cigarettes in particular, to which commodities enveloped in wrappers for sealing are conveyed by relative infeed means, characterized in that it comprises
  - a sealing channel into which the commodities are directed at one end by the infeed means;
  - feed means by which the commodities are directed along the sealing channel; and
  - drive means by which the feed means are set in motion in such a way as to determine the duration of the passage of each commodity along the sealing channel according to given physical properties of the wrappers and independently of the operating tempo of the infeed means.
- 2) A device as in claim 1, wherein the sealing channel is compassed between means by which to guide the

commodities and means by which at least one face of the wrapper is bilaterally compressed and sealed.

- 3) A device as in claim 2, wherein the sealing channel describes an arc to a circle, and the bilateral compression and sealing means consist in a pair of disks constituting two side walls of the channel, rotatable about axes angled in relation to the axis of the channel and arranged such that their point of minimum clearance one from another occurs substantially midway along the sealing channel.
- 4) A device as in claim 1, wherein the feed means are activated continuously by the drive means.
- 5) A device as in claim 3, wherein heat is generated from each disk by way of a raised circumferential profile disposed coaxial with the disk and facing a similar raised profile afforded by the remaining disk of the pair.
- 6) A device as in claim 2, wherein the guide means and/or the bilateral compression and sealing means also constitute feed means by which the commodities are directed along the sealing channel.

- 7) A device as in claim 6, wherein the sealing channel describes an arc to a circle, bilateral compression and sealing means consist in a pair of disks that constitute two side walls of the channel, rotatable about axes angled in relation to the axis of the channel and arranged in such a manner that their point of minimum clearance one from another occurs substantially midway along the sealing channel, and the sealing channel is compassed internally by feed and guide means consisting in at least one first conveyor belt looped around at least one respective pulley driven in rotation synchronously with the rotating and heated disks about an axis passing through the intersection of the axes of rotation of the disks.
- 8) A device as in claim 7, toward which commodities are advanced by the infeed means through a radial direction, in relation to the pulley, comprising a plate disposed transversely to the infeed means and tangential to the pulley, and means by which to transfer the commodities synchronously with the operation of the infeed means at least along a trajectory describing an arc to a circle of which the centre coincides with the intersection of the

axes of rotation of the heated disks, and at least between a first limit position of reception in which a commodity is positioned in alignment with the infeed means and in contact with the plate, and a second limit position of release in which the commodity is taken up between the guide means and the bilateral compression and sealing means and occupies the initial stretch of the trajectory.

- 9) A device as in claim 7, wherein the sealing channel is compassed externally by feed means and guide means consisting in at least one second conveyor belt looped around relative pulleys, set in motion synchronously with the rotating and heated disks and riding slidably on respective guides disposed in such a way that the branch of the second belt compassing the channel describes an arc to a circle of which the centre coincides with the intersection of the axes of rotation of the heated disks.
- 10) A device as in claim 7, wherein the first conveyor belt is looped also around a second pulley of which the position relative to the first pulley is such that the first belt affords a rectilinear branch disposed in opposition to further conveyor means

driven synchronously and combining with the first belt to form a runout channel continuing from and tangential to the sealing channel.

- 11) A device for sealing wrappers in machines for wrapping and/or overwrapping commodities, in particular packets of cigarettes, substantially as described with reference to the figures of the accompanying drawings.

Patents Act 1977  
Examiner's report to the Comptroller under  
Section 17 (The Search Report)

- 19 -  
Application number

GB 9213666.2

Relevant Technical fields

- (i) UK Cl (Edition K ) B8C (CU32); B5K (K3A3)
- (ii) Int Cl (Edition 5 ) B65B 51/10, 51/16, 51/18

Search Examiner

LINDA HARDEN

Databases (see over)

(i) UK Patent Office

(ii)

Date of Search

28.9.92

Documents considered relevant following a search in respect of claims

1-11

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1544644 (SOCIETE PER AZIONI) see the figure and channel E	1,2
X	EP 0395809 A1 (MOLINS) see in particular page 12 lines 17-41	1,2,4 and 6

SF2(p)

ME - doc99\fil000341

Category	Identification of document and relevant passages	Relevance to claim(s)

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